

REMARKS

In response to the office action dated April 29, 2010, the applicant has amended claims 1, 6, 8-9, 12-13, and 17. Claims 1-21 are presented for examination.

35 U.S.C §103 rejections

Claims 1-4 and 13-15 were rejected under 35 U.S.C. §103(a) as being unpatentable over Simmons, US 6,741,911 ("Simmons"), in view of McIntosh, US 5,103,404 ("McIntosh"), in further view of Rosenberg, "'Virtual fixtures': Perceptual overlays enhance operator performance in telepresence tasks" Stanford University, Stanford, CA, August 1994 ("Rosenberg").

Simmons does not describe or make obvious "a body suit." Instead, Simmons' actuators are directly attached to the user and the robot (column 6, lines 33-37). For example, actuators 40 and 42 are directly attached to a finger, not a body suit (column 5, lines 3-5 and FIGD. 3A-3C). The examiner referred to column 6, lines 33-51, and column 8, lines 39-50 as describing "a body suit". These descriptions as reproduced below say nothing about a body suit, but instead indicate that the actuators are directly attached to the user and the robot:

Having the same external actuator assembly on the user and the robot as described here has the advantages of being an effective means as well as being an ideal testing environment for development and a simpler configuration to explain as we attempt to communicate the mathematics, geometry, computer communications and logic controlling the balanced relationship between the joint assembly on the local end and the joint assembly on the remote end. Thus, when an actuator at the local end moves a joint 7 degrees, you can expect an essentially identical (although sometimes reversed as described below) actuator response at the remote end rather than having to calculate and visualize a complex conversion between differing geometries and equipment at the local and remote. Thus this example embodiment of the current invention will describe the external actuators, limb control hardware and body limbs and joints as being operatively identical at the local and remote. The current invention allows for any number of additional external actuators to be added to the control assemblies described here. (column 6, lines 33-51, emphasis added)

10. The current invention also collects delicate sensory information at the remote including touch and vibration. Using an array of tiny sensors at the remote capturing pressure and vibration on fingertips and as many other areas as desired, these measurements, when received at the local computer, are converted to, at the relative position on the local user, both vibration and pressure using, in this embodiment, an array of voice coil points effecting pressure and carrying vibration data as well to the user where that pressure and vibration provide extended touch sensitivity of remote conditions to the local user. (column 8, lines 39-50)

Simmons also does not describe or make obvious “[generate] the supplemental virtual tactile sensation signals from the data retrieved from the computer storage medium to feed the tactile signals from the corresponding tactile sensors and the generated supplemental tactile sensation signals to the tactile actuators in the body suit,” as recited by amended claim 1. The examiner stated (emphasis added):

Simmons further describes the user apparatus overlays supplemental tactile sensations from stored virtual tactile sensations that are sent to the body suit (column 8, line 62-column 9, line 4, and column 12, lines 56-65) in the form “[user] feels the rocks holding him up and the wind shaking his body” in a virtual world that does not exist.

The applicant disagrees. As explained previously, Simmons does not describe “a body suit”, and therefore, would not have sent any signals “to the tactile actuators in the body suit.” In addition, Simmons does not generate “supplemental virtual tactile sensation signals from the data retrieved from the computer storage medium.” To the contrary, Simmons sends real data collected from a remote robot to a user such that although the user remains local, the user senses the remote environment (column 10, lines 16-20). Although the user’s sensed world does not exist locally and is called a virtual world to the user, it does correspond to a real remote environment (id.), and is not from data “retrieved from the computer storage medium”. Simmons requires the remote robot and the local user to be effectively identical or perfectly proportional (column 5, lines 61-62, and column 9, lines 3-4), such that the local user views real-time display of the remote environment and feels the identical or perfectly proportional feeling of the remote robot (column 6, line 66-column 7, line 4, column 9, lines 3-4 and 16-26). Simmons did not use signals from data “retrieved from the computer medium”. Simmons states:

..., the remote and the local "bodies" are considered to be effectively identical (or at least proportional) in size, weight and balance. ..., in the simplest embodiment to communicate, they are effectively identical except that the human has living bones and joints while the robot has mechanical "bones" and joints. (column 5, line 61-column 6, line 1)

..., since the local user and the robot are completely synchronized throughout the body, the image he sees directly in front of him is, effectively, his own hand, arms, etc. holding and manipulating objects that appear to be in his hands but are responsive to anything he does to them even though the actual held object is miles away. (column 9, lines 16-22, emphasis added)

... the multi-stepped cycle can be viewed as beginning with a user movement communicated to a nearby computer and, finally, after multiple other steps, ending with the user "feeling" the remote environment and being placed in sync with it. (column 10, lines 16-20, emphasis added)

... actual actuator position (degree of retraction/extension) and pressure values are sent. Each end of this communication emulates some or all of these values such that the two bodies are in sync. (column 11, lines 64-67)

McIntosh does not remedy at least the above deficiencies of Simmons.

Rosenberg also does not describe or make obvious "a body suit having tactile actuators," as recited by amended claim 1. Rosenberg uses a body exoskeleton to act as a sensor without having force information reflected back to the user through the exoskeleton (page 12, third paragraph).

In addition, Rosenberg does not "generate the supplemental virtual tactile sensation signals from the data retrieved from the computer storage medium," but instead uses physical sheets as virtual fixtures. Rosenberg describes an operator remotely operating on a task board (page 11) by viewing the task board through a vision system, and controlling a control local to the operator to move a remote robot arm to operate on the task board (FIG. 5, page 15). To facilitate the operation, virtual fixtures (not existing at the remote task board) are provided locally to restrain the control of the operator so that the remote robot arm moves precisely (page 14, last paragraph, page 15, first paragraph, and page 16, third paragraph). The virtual fixtures that provide haptic information to the operator are made by acrylic sheets (page 15, second paragraph) and are physical, not "virtual". Although Rosenberg states that the fixtures can possibly be computer-generated, such computer-generated fixtures are merely a possible concept (page 16, first paragraph). Rosenberg does not describe or make obvious how this concept can be realized, let alone "[generate] the supplemental virtual tactile sensation signals from the data retrieved from the computer storage medium."

It would not have been obvious to combine Simmons and Rosenberg, even if the references were combined, the result would not have been the features of amended claim 1.

Independent claim 13 is patentable for at least the reasons discussed for claim 1. The dependent claims are patentable for at least the reasons discussed for respective independent claims.

Claims 5, 8, 9, 16, and 18 were rejected under 35 U.S.C. §103(a) as being unpatentable over Simmons in view of McIntosh, and Rosenberg, and further in view of Simmons, US 20030030397 ("Simmons II"). Claims 10 and 19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Simmons in view of McIntosh, Rosenberg and Simmons II, and further in view of Algazi, US7,333,622 ("Algazi"). Claims 11, 12, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Simmons in view of McIntosh, and Rosenberg Simmons in view of McIntosh, Rosenberg, and Algazi, and Simmons in view of McIntosh, Rosenberg, and Simmons II, further in view of Yee, US 6,016,385 ("Yee"). Claims 6, 7 and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over Simmons in view of McIntosh, Rosenberg, Simmons II and Yee, and further in view of Abbasi, US 6,786,863 (Abbasi).

Independent claim 1 is patentable over Simmons, McIntosh, Rosenberg, Simmons II, Algazi, Yee, and Abbasi, at least because none of Simmons II, Algazi, Yee, and Abbasi, describes or makes obvious "a body suit" or "[generate] the supplemental virtual tactile sensation signals from the data retrieved from the computer storage medium to feed the tactile signals from the corresponding tactile sensors and the generated supplemental tactile sensation signals to the tactile actuators in the body suit," as recited by amended claim 1. Independent claim 13 is patentable for at least similar reasons. Dependent claims 5, 8, 9, 16, and 18 are patentable for at least the reasons discussed for respective dependent claims.

All of the dependent claims are patentable for at least similar reasons as those for the claims on which they depend are patentable.

Canceled claims, if any, have been canceled without prejudice or disclaimer.

Any circumstance in which the applicant has (a) addressed certain comments of the examiner does not mean that the applicant concedes other comments of the examiner, (b) made

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arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims, or (c) amended or canceled a claim does not mean that the applicant concedes any of the examiner's positions with respect to that claim or other claims.

Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

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